MATERIAL SAFETY DATA SHEET

SRM Supplier: **National Institute of Standards and Technology**
Standard Reference Materials Program
100 Bureau Drive, MS 2321
Gaithersburg, Maryland 20899-2321

SRM Number: 4947C
MSDS Number: 4947C
SRM Name: Tritrated Toluene Radioactivity Standard

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SECTION I. MATERIAL IDENTIFICATION

Material Name: Tritiated-Toluene Radioactivity Standard for Liquid-Scintillation Counting

Description: This material is a tritrated-toluene radioactivity standard contained in a flame-sealed glass ampoule. Each unit contains 4 mL of solution.

Other Designations: **Hydrogen-3** (tritium) labeled **Toluene** (methyl benzene; methyl benzol; phenylmethane; toluol)

Name	Chemical Formula	CAS Registry Number
Toluene	$C_6H_5CH_3$	108-88-3

DOT Classification: Flammable Liquid, UN1294

SRM 4947C IS A RADIOACTIVE MATERIAL WITH A MASSIC ACTIVITY OF APPROXIMATELY 300 kBq/g. THE HAZARDOUS INFORMATION SUPPLIED FOR THIS MATERIAL IS FOR THE CHEMICAL HAZARD ONLY! FOR THE RADIOACTIVE HAZARDS ASSOCIATED WITH THIS MATERIAL, REFER TO THE PACKAGE LABELING AND THE INSERT SHEETS.

SECTION II. HAZARDOUS INGREDIENTS

Hazardous Component	Nominal Concentration (%)	Exposure Limits and Toxicity Data
Toluene	100	ACGIH TWA: 50 mg/kg (skin)
		OSHA TLV-TWA: 100 mg/kg or 377 mg/m^3
		OSHA STEL: 150 mg/kg or 565 mg/m^3
		NIOSH TWA: 100 mg/kg or 375 mg/m^3 (recommended for 10 h)
		Human Oral: LD_{LO}: 50 mg/kg
		Human, Inhalation: TC_{LO}: 200 mg/kg
		Rat, Oral: LD_{50}: 636 mg/kg
		Rat, Inhalation: LC_{50}: 49 g/m^3/4 h

SECTION III. PHYSICAL/CHEMICAL CHARACTERISTICS

Toluene	
Appearance and Odor: colorless liquid with a distinct odor	**Vapor Pressure (@ 20 °C):** 22 mm Hg
Relative Molecular Weight: 92.14	**Evaporation Rate (butyl acetate = l):** 2.24
Specific Gravity (Water = 1 @ 120 °C): 0.8669	**Viscosity (@ 20 °C):** not available
Boiling Point: 111 °C	**Freezing Point:** -95 °C
Water Solubility (@ 20 °C): 0.05 %	**Solvent Solubility:** soluble in alcohol, ether, benzene, chloroform, and acetone

SECTION IV. FIRE AND EXPLOSION HAZARD DATA

Flash Point: 4 °C **Method Used:** CC **Autoignition Temperature:** 480 °C

Flammability Limits in Air (Volume %): UPPER: 7.1
LOWER: 1.2

Unusual Fire and Explosion Hazards: Toluene is a severe fire and explosion hazard. Its vapors are heavier than air and may travel a considerable distance to a source of ignition and flash back. Vapor and air mixtures are explosive. Aromatic hydrocarbons react with strong oxidizing agents.

Extinguishing Media: Use alcohol-resistant foam, dry chemical, carbon dioxide, or water spray.

Special Fire Procedures: Toluene is a highly flammable liquid (OSHA Class lB flammable liquid). It must be kept away from heat sources, sparks, and open flames. Fire fighters should wear a self-contained breathing apparatus (SCBA) along with proper eye and skin protection.

SECTION V. REACTIVITY DATA

Stability: **X** **Stable** _____ **Unstable**

Conditions to Avoid: Avoid generating dust and contact with incompatible materials. Avoid heat, flames, sparks, and other sources of ignition. Dangerous gases may accumulate in confined spaces.

Incompatibility (Materials to Avoid): Toluene is incompatible with combustible materials, halogens, acids, metal salts, and oxidizing materials.

See Section IV**: "**Fire and Explosion Hazard Data."

Hazardous Decomposition or Byproducts: Thermal decomposition products may include toxic oxides of carbon and hydrocarbons.

Hazardous Polymerization _____ **Will Occur** **X** **Will Not Occur**

SECTION VI. HEALTH HAZARD DATA

Route of Entry:	X	Inhalation	X	Skin	X	Ingestion

Health Hazards (Acute and Chronic): Toluene may be harmful if swallowed, inhaled, or absorbed through skin. Vapor or mist are irritating to the skin, eyes, mucous membranes, and upper respiratory tract. Odor detection may be insufficient for warning due to olfactory fatigue. Prolonged or repeated exposure may cause vomiting, insomnia, nosebleeds, chest pains, euphoria, headache, vertigo, nausea, anorexia, tinnitus, impaired speech and vision, momentary loss of memory, and loss of coordination. Chromosome changes have been observed in workers exposed to toluene. Reproductive effects have been reported in animals and human studies indicate that toluene may cross the placenta.

Alcohol may enhance the toxic effects. The metabolism of other solvents may be inhibited resulting in a potentiation of toxic effects of those chemicals. Uptake is directly proportional to the amount of body fat. Blood levels may be cumulative when exposure is extended. The approximate lethal dose in humans is 15 ml to 30 ml.

Medical Conditions Generally Aggravated by Exposure: kidney, liver, respiratory, skin disorders, and allergies

Listed as a Carcinogen/Potential Carcinogen:

	Yes	No
In the National Toxicology Program (NTP) Report on Carcinogens		X
In the International Agency for Research on Cancer (IARC) Monographs		X
By the Occupational Safety and Health Administration (OSHA)		X

EMERGENCY AND FIRST AID PROCEDURES:

Skin Contact: Remove contaminated shoes and clothing. Rinse affected area with large amounts of water followed by washing the area with soap and water. Obtain medical assistance if necessary.

Eye Contact: Immediately flush eyes, including under the eyelids, with copious amounts of water for at least 15 minutes. Obtain medical assistance if necessary.

Inhalation: If inhaled, move the victim to fresh air. If breathing is difficult, give oxygen; if the victim is not breathing, give artificial respiration. Obtain medical assistance if necessary.

Ingestion: If ingestion occurs, wash out mouth with water. Obtain medical assistance immediately.

TARGET ORGAN(S) OF ATTACK: central nervous system (CNS)

SECTION VII. PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to be Taken in Case Material Is Released or Spilled: Notify safety personnel of major spills and/or leaks. Evacuate nonessential personnel. Stop the leak if one can do so without risk. Absorb small spills with sand or other absorbent material and place into appropriate containers for disposal.

Waste Disposal: Follow all federal, state, and local regulations.

Handling and Storage: Persons handling this material should wear an air purifying respirator with a high efficiency particulate filter. The specific respirator selected must be based on contamination levels found in the workplace, must be based on the specific operation, must **NOT** exceed the working limits of the respirator, and must be jointly approved by the National Institute for Occupational Safety and Health (NIOSH) and the Mine Safety and Health Administration (MSHA). Additional protective clothing, such as gloves, lab coats, and splash-proof or dust-resistant safety goggles, should be worn.

> **NOTE:** Contact lenses pose a special problem; soft lenses may absorb irritants and all lenses concentrate them. **DO NOT** wear contact lenses in the laboratory.

Store material in a cool, dry, well ventilated area away from flames, sources of ignition, and incompatible materials.

SECTION VIII. SOURCE DATA/OTHER COMMENTS

Sources: MDL Information Systems, Inc., MSDS *Toluene*, 18 September 2003.
Merck Index; 11th Ed., 1989.
The Sigma Aldrich Library of Chemical Safety Data; ed. II, 1988.